

Cable systems talk to computers

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In the fall of 1984, the Sofcast Corp. established the National Digital Network and began distribution of a show called Softcast to radio stations. Softcast contains all the usual ingredients one hears on a radio station, i.e., talk, music, commercial spots and so on. However, the first-time listener immediately notices there is a difference from the usual banter heard when tuning across the dial. The entire content of the Softcast show is directed to owners of personal computers. The news segment highlights events in the computer industry. The music originates in a silicon chip rather than from a keyboard. The announcers are human but they are occasionally upstaged by a smooth-talking Macintosh.

Broadcasting computer programs

Other strange sounds are heard in addition to the slightly syncopated notes of computer-generated music. Every so often, during the show, the listener hears a steady buzz. These sounds represent a computer program. The sounds picked up on a radio are interfaced to the listener's computer via a device called a Shuttle Communicator. Within two to 20 seconds a complete computer program is transferred from the Softcast studios to the listener's personal computer. During the transfer, the computer screen flashes to indicate a Softcast transmission is being received. Then the computer requests a file name. The listener enters an identifier on the keyboard. Finally, the disk drive whirs momentarily and the recipient's program library increases by one. All Softcast software is free.

Not only can programs be transferred but also text files such as instructions, program documentation, news stories, magazine articles and so on. Coupons for merchandise specials and discounts are broadcast regularly to the listener's printer. Detailed weather maps, from the National Weather Service, can be transmitted. It is even possible to send pictures by radio. The first such Softcast occurred two days before the 1984 presidential election. The show transmitted a picture of Ronald Reagan and predicted that he would be the winner. After a picture transmission, the "floppy disk jockey," Robert E. Lee Hardwick, loves to remind listeners that "you saw it first on your radio."

The Shuttle Communicator and the Softcast technique were developed by Microperipheral Corp. This manufacturer of modems, videotex systems and voice recognition/delivery equipment is located in Redmond, Wash. The Sofcast Corp. was established to market the product and is the sole licensee.



Pictures, line drawings, color photos and weather maps can be transmitted to home computers.

Cable softcasting

Early this year the decision was made to extend the Softcast radio feed to cable systems. It was a natural marriage. Surveys indicate that up to 40 percent of the homes in a cable service area have personal computers.

The radio show is generally a half-hour in length. Broadcasting on cable networks makes it possible to extend this around the clock. With no time constraints, it is possible to have a half-hour devoted to the IBM, another for the Apple, a third for the Commodore, and so on. Softcasting on the cable also permits much longer programs to be transmitted to listeners. The contents of entire disks can be transmitted during the night and "captured" by a computer while the owner is asleep.

The first system

The first cable system to come on-line was Viacom in the Seattle area. The management at Viacom recognized that Softcast provided a highly desirable service. The Shuttle Communicator could be used as a marketing tool for attracting new customers and retaining existing subscribers. Traditionally this type of product would be installed and leased by the cable operator.

Rather than take the traditional approach, Viacom permitted Sofcast Corp. to market the device directly to Viacom customers on a per-sale commission basis. Even more revolutionary was Viacom's decision to permit customers to install the cable version of the Shuttle Communicator, much the same as for a VCR. Splitters and coax supplied by Viacom are



The Shuttle Communicator can be used with encryption devices, such as the Enigma Logic Safeword system.

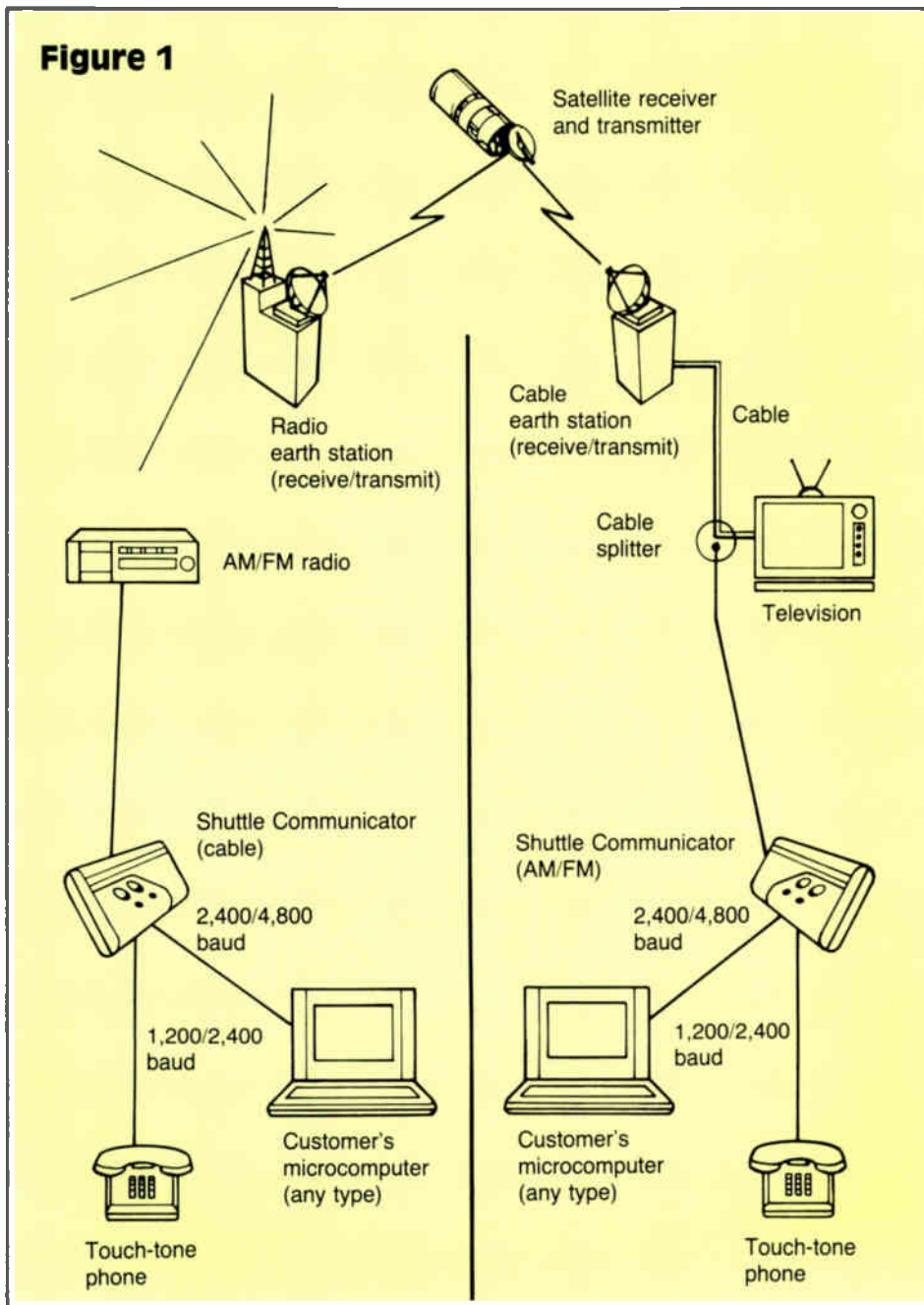
used with the cable version of the Shuttle Communicator. This ensures the continued integrity of the Viacom system.

Program distribution

The program content is supplied to the Viacom headend in north Seattle and to local radio stations by a leased telephone line. Outside the local area, satellite distribution is mandatory. A single carrier per channel frequency (SCPC) on Westar IV is currently used to transmit the feed. Discussions are now underway and hopefully by fall the feed will be available off Satcom III-R.

The audio feed from the satellite receiver passes through a data regenerator. This device recovers the original data and verifies that no transmission errors have occurred. It also includes a modulation limiter to ensure that no

Figure 1



overmodulation by voice or data occurs. Finally, the regenerator remodulates a tone generator in the Softcast format to recreate an undistorted duplicate of the original transmission. The output of the regenerator is connected to a Wegener 1692 monaural FM transmission card at the cable system headend.

Listeners can receive the broadcasts by having their AM/FM tuners connected to the cable feed. The Softcast program occupies a formerly blank spot on the dial. It can be received by tuning the radio to the broadcast frequency, the same as for any other radio station.

The Shuttle Communicator

The computer data is extracted at the audio output connection of the tuner. This, in turn, feeds the Shuttle Communicator mentioned earlier. Basically, the device is an analog-to-digital converter, or demodulator, which con-

verts the incoming sounds to a serial data stream.

The Shuttle Communicator is available in a number of variations. The most popular is the RS232 version, since it can be used in conjunction with many different types of computers. There are several model-specific versions that do not require that a serial interface be installed in the computer. For example, the Apple IIe version feeds the game paddle port. The data, in turn, drives a software UART. The Commodore version plugs directly into the user port. No RS232 adapter is required. There is even an RS422 version available for the Macintosh.

The subscriber's AM/FM tuner may not be connected to the cable, or it may be located at some distance from the computer. There is a cable version of the Shuttle Communicator to cover this situation. In addition to the A/D converter, the cable version of the Shuttle Com-

municator contains a complete FM receiver, an audio system and a speaker.

The data format

As mentioned earlier, all data received via the Shuttle Communicator is free of charge. This concept permits a number of cost-saving design considerations. Since the information is free, there is no need to encrypt the data. Conceptually, every aspect is kept simple and straightforward to minimize cost and complication for the listener.

Frequency shift keying (FSK) is used, rather than the more expensive phase shift system. The data is transmitted asynchronously at 4,800 baud, using an eight-bit word, no parity and one stop bit. The 4,800 baud rate was carefully chosen after an extensive study of existing personal computers. Most computers can operate at rates faster than 480 characters per second. However, they all rely on handshaking to prevent overflow of buffers or dropped characters. Obviously, it's not possible to handshake a one-way radio path. Handshaking is not required at 4,800 baud so long as the screen display is turned off. Very few computers can receive data this fast and still reorganize the screen each time the lines scroll.

Only one computer presented problems operating at 4,800 baud. The ROM-based software in the Commodore 64 permits a maximum rate of 2,400 baud. However, serial communication at 4,800 baud was accomplished by writing a machine language UART program. The program is supplied on a disk with the Commodore 64/128 version of the Shuttle Communicator. While the data format is conventional, the FSK signal is somewhat unusual. It was tailored to permit transmission through narrow bandwidths. The data rate can be twice the theoretical maximum when using frequency shift keying. The overall system is patented by the Microperipheral Corp.

Shuttle software

The use of an eight-bit word permits the transmission of binary information and direct disk-to-disk transfers. However an eight-bit word excludes the use of the parity bit for error detection. To ensure that the listener has received a correct copy of the data, a checksum is transmitted as part of the header information that precedes the program content. The header also describes the program, names the target computer and indicates the exact length of the program in bytes. The end-of-header byte opens the capture buffer in the target computer. The terminal software then counts the number of received bytes and turns off the buffer at the appropriate count. At this point a matching checksum is calculated. If this agrees with the transmitted checksum, the software verifies that a valid copy of the program has been received. The program can then be saved to disk with reasonable assurance that it will load and run.

For those who would like to evaluate a demo tape of the Softcast show, they are available by writing Sofcast Corp., 2565 152nd Ave., N.E., Redmond, Wash. 98052. 